

SEQUENCE LISTING

<110> Jaworski, Jan G.
 Post-Beittenmiller, Martha A.
 Todd, James

<120> FATTY ACID ELONGASES

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Ser Asn Gln Ala Val Gln Leu Asp Thr Ala Thr Arg Leu Thr Cys Leu
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Val Phe Leu Ser Phe Val Leu Thr Leu Tyr Val Ala Asn Arg Ser Lys
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Pro Val Tyr Leu Val Asp Phe Ser Cys Tyr Lys Pro Glu Asp Glu Arg
115 120 125
Lys Ile Ser Val Asp Ser Phe Leu Thr Met Thr Glu Glu Asn Gly Ser
130 135 140
Phe Thr Asp Asp Thr Val Gln Phe Gln Gln Arg Ile Ser Asn Arg Ala
145 150 155 160
Gly Leu Gly Asp Glu Thr Tyr Leu Pro Arg Gly Ile Thr Ser Thr Pro
165 170 175
Pro Lys Leu Asn Met Ser Glu Ala Arg Ala Glu Ala Glu Ala Val Met
180 185 190
Phe Gly Ala Leu Asp Ser Leu Phe Glu Lys Thr Gly Ile Lys Pro Ala
195 200 205
Glu Val Gly Ile Leu Ile Val Asn Cys Ser Leu Phe Asn Pro Thr Pro
210 215 220
Ser Leu Ser Ala Met Ile Val Asn His Tyr Lys Met Arg Glu Asp Ile
225 230 235 240
Lys Ser Tyr Asn Leu Gly Gly Met Gly Cys Ser Ala Gly Leu Ile Ser
245 250 255
Ile Asp Leu Ala Asn Asn Leu Leu Lys Ala Asn Pro Asn Ser Tyr Ala
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Val Val Val Ser Thr Glu Asn Ile Thr Leu Asn Trp Tyr Phe Gly Asn
275 280 285
Asp Arg Ser Met Leu Leu Cys Asn Cys Ile Phe Arg Met Gly Gly Ala
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Ala Ile Leu Leu Ser Asn Arg Arg Gln Asp Arg Lys Lys Ser Lys Tyr
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Tyr Asn Cys Val Tyr Gln Lys Glu Asp Glu Arg Gly Thr Ile Gly Val
340 345 350
Ser Leu Ala Arg Glu Leu Met Ser Val Ala Gly Asp Ala Leu Lys Thr
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Lys	Pro	Tyr	Ile	Pro	Asp	Phe	Lys	Leu	Ala	Phe	Glu	His	Phe	Cys	Ile
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Gly	Asn	Thr	Ser	Ser	Ser	Leu	Trp	Tyr	Glu	Met	Ala	Tyr	Thr	Glu	
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Val	Ser	Thr	Glu	Glu	Met	Thr	Gly	Asn	Ala	Trp	Ala	Gly	Ser	Ile	Asp
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ctcggtgact	ttagctgcta	cctcccaccg	tcgcacatctca	aagccagcac	ccagaggatc	300
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atggacttct	gcgagaagat	tctagaacgt	tccggctctag	gccaagagac	gtacgtaccc	420
gaaggtcttc	aaactttgcc	actacaacag	aatttggctg	tatcacgtat	agagacggag	480
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gttgggttt	ccttgtcaaa	gaatctacca	atggtagctg	caagaaccct	aaagatcaat	1020
atcgcaactt	tgggtccgct	tgttcttccc	ataagcgaga	agtttcaactt	ctttgtgagg	1080
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35 40 45
Tyr Leu Gln Asn Asn His Thr Ser Leu Thr Met Phe Phe Leu Tyr Leu
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Ala Leu Gly Ser Thr Leu Tyr Leu Met Thr Arg Pro Lys Pro Val Tyr
65 70 75 80
Leu Val Asp Phe Ser Cys Tyr Leu Pro Pro Ser His Leu Lys Ala Ser
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Thr Gln Arg Ile Met Gln His Val Arg Leu Val Arg Glu Ala Gly Ala
90 100 105 110
Trp Lys Gln Glu Ser Asp Tyr Leu Met Asp Phe Cys Glu Lys Ile Leu
115 120 125
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130 135 140
Thr Leu Pro Leu Gln Gln Asn Leu Ala Val Ser Arg Ile Glu Thr Glu
145 150 155 160
Glu Val Ile Ile Gly Ala Val Asp Asn Leu Phe Arg Asn Thr Gly Ile
165 170 175
Ser Pro Ser Asp Ile Gly Ile Leu Val Val Asn Ser Ser Thr Phe Asn
180 185 190
Pro Thr Pro Ser Leu Ser Ser Ile Leu Val Asn Lys Phe Lys Leu Arg
195 200 205
Asp Asn Ile Lys Ser Leu Asn Leu Gly Gly Met Gly Cys Ser Ala Gly
210 215 220
Val Ile Ala Ile Asp Ala Ala Lys Ser Leu Leu Gln Val His Arg Asn
225 230 235 240
Thr Tyr Ala Leu Val Val Ser Thr Glu Asn Ile Thr Gln Asn Leu Tyr
245 250 255
Met Gly Asn Asn Lys Ser Met Leu Val Thr Asn Cys Leu Phe Arg Ile
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Gly Gly Ala Ala Ile Leu Leu Ser Asn Arg Ser Ile Asp Arg Lys Arg
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Ala Lys Tyr Glu Leu Val His Thr Val Arg Val His Thr Gly Ala Asp
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Asp Arg Ser Tyr Glu Cys Ala Thr Gln Glu Glu Asp Glu Asp Gly Ile
305 310 315 320
Val Gly Val Ser Leu Ser Lys Asn Leu Pro Met Val Ala Ala Arg Thr
325 330 335
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340 345 350
Glu Lys Phe His Phe Phe Val Arg Phe Val Lys Lys Lys Phe Leu Asn
355 360 365
Pro Lys Leu Lys His Tyr Ile Pro Asp Phe Lys Leu Ala Phe Glu His

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Asn	Leu	His Leu Thr	Pro Leu Asp Val	Glu Ala Ser Arg Met
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His	Arg	Phe Gly Asn Thr Ser	Ser Ser Ile	Trp Tyr Glu Leu Ala
		420	425	430
Tyr	Thr	Glu Ala Lys Gly Arg	Met Thr Lys Gly Asp	Arg Ile Trp Gln
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Ile	Ala	Leu Gly Ser Gly	Phe Lys Cys Asn Ser	Ser Val Trp Val Ala
		450	455	460
Leu	Arg	Asn Val Lys Pro	Ser Thr Asn Asn Pro	Trp Glu Gln Cys Leu
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Q <213> Arabidopsis thaliana

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35 40 45
Lys Ile Asn Val Glu Asp Leu Gln Lys Phe Ser Leu His His Thr Gln
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Asn Asn Leu Gln Thr Ile Ser Leu Leu Phe Leu Val Val Phe Val
65 70 75 80
Trp Ile Leu Tyr Met Leu Thr Arg Pro Lys Pro Val Tyr Leu Val Asp
85 90 95
Phe Ser Cys Tyr Leu Pro Pro Ser His Leu Lys Val Ser Ile Gln Thr
100 105 110
Leu Met Gly His Ala Arg Arg Ala Arg Glu Ala Gly Met Cys Trp Lys
115 120 125
Asn Lys Glu Ser Asp His Leu Val Asp Phe Gln Glu Lys Ile Leu Glu
130 135 140
Arg Ser Gly Leu Gly Gln Glu Thr Tyr Ile Pro Glu Gly Leu Gln Cys
145 150 155 160
Phe Pro Leu Gln Gln Gly Met Gly Ala Ser Arg Lys Glu Thr Glu Glu
165 170 175
Val Ile Phe Gly Ala Leu Asp Asn Leu Phe Arg Asn Thr Gly Val Lys
180 185 190
Pro Asp Asp Ile Gly Ile Leu Val Val Asn Ser Ser Thr Phe Asn Pro
195 200 205
Thr Pro Ser Leu Ala Ser Met Ile Val Asn Lys Tyr Lys Leu Arg Asp
210 215 220
Asn Ile Lys Ser Leu Asn Leu Gly Gly Met Gly Cys Ser Ala Gly Val
225 230 235 240
Ile Ala Val Asp Val Ala Lys Gly Leu Leu Gln Val His Arg Asn Thr
245 250 255
Tyr Ala Ile Val Val Ser Thr Glu Asn Ile Thr Gln Asn Leu Tyr Leu
260 265 270
Gly Lys Asn Lys Ser Met Leu Val Thr Asn Cys Leu Phe Arg Val Gly
275 280 285
Gly Ala Ala Val Leu Leu Ser Asn Arg Ser Arg Asp Arg Asn Arg Ala
290 295 300
Lys Tyr Glu Leu Val His Thr Val Arg Ile His Thr Gly Ser Asp Asp
305 310 315 320
Arg Ser Phe Glu Cys Ala Thr Gln Glu Glu Asp Glu Asp Gly Ile Ile
325 330 335
Gly Val Thr Leu Thr Lys Asn Leu Pro Met Val Ala Ala Arg Thr Leu
340 345 350
Lys Ile Asn Ile Ala Thr Leu Gly Pro Leu Val Leu Pro Leu Lys Glu
355 360 365
Lys Leu Ala Phe Phe Ile Thr Phe Val Lys Lys Lys Tyr Phe Lys Pro
370 375 380
Glu Leu Arg Asn Tyr Thr Pro Asp Phe Lys Leu Ala Phe Glu His Phe
385 390 395 400
Cys Ile His Ala Gly Gly Arg Ala Leu Ile Asp Glu Leu Glu Lys Asn

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Arg Phe Gly Asn Thr Ser Ser Ser Ile Trp Tyr Glu Leu Ala Tyr		
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Thr Glu Ala Lys Gly Arg Met Lys Glu Gly Asp Arg Ile Trp Gln Ile		
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Ala Leu Gly Ser Gly Phe Lys Cys Asn Ser Ser Val Trp Val Ala Leu		
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35 40 45
Lys Tyr Val Lys Leu Gly Tyr His Tyr Leu Ile Asn His Ala Val Tyr
50 55 60
Leu Ala Thr Ile Pro Val Leu Val Leu Val Phe Ser Ala Glu Val Gly
65 70 75 80
Ser Leu Ser Arg Glu Glu Ile Trp Lys Lys Leu Trp Asp Tyr Asp Leu
85 90 95
Ala Thr Val Ile Gly Phe Phe Gly Val Phe Val Leu Thr Ala Cys Val
100 105 110
Tyr Phe Met Ser Arg Pro Arg Ser Val Tyr Leu Ile Asp Phe Ala Cys
115 120 125
Tyr Lys Pro Ser Asp Glu His Lys Val Thr Lys Glu Glu Phe Ile Glu
130 135 140
Leu Ala Arg Lys Ser Gly Lys Phe Asp Glu Glu Thr Leu Gly Phe Lys
145 150 155 160
Lys Arg Ile Leu Gln Ala Ser Gly Ile Gly Asp Glu Thr Tyr Val Pro
165 170 175
Arg Ser Ile Ser Ser Ser Glu Asn Ile Thr Thr Met Lys Glu Gly Arg
180 185 190
Glu Glu Ala Ser Thr Val Ile Phe Gly Ala Leu Asp Glu Leu Phe Glu
195 200 205
Lys Thr Arg Val Lys Pro Lys Asp Val Gly Val Leu Val Val Asn Cys
210 215 220
Ser Ile Phe Asn Pro Thr Pro Ser Leu Ser Ala Met Val Ile Asn His
225 230 235 240
Tyr Lys Met Arg Gly Asn Ile Leu Ser Tyr Asn Leu Gly Gly Met Gly
245 250 255
Cys Ser Ala Gly Ile Ile Ala Ile Asp Leu Ala Arg Asp Met Leu Gln
260 265 270
Ser Asn Pro Asn Ser Tyr Ala Val Val Val Ser Thr Glu Met Val Gly
275 280 285
Tyr Asn Trp Tyr Val Gly Ser Asp Lys Ser Met Val Ile Pro Asn Cys
290 295 300
Phe Phe Arg Met Gly Cys Ser Ala Val Met Leu Ser Asn Arg Arg Arg
305 310 315 320
Asp Phe Arg His Ala Lys Tyr Arg Leu Glu His Ile Val Arg Thr His
325 330 335
Lys Ala Ala Asp Asp Arg Ser Phe Arg Ser Val Tyr Gln Glu Glu Asp
340 345 350
Glu Gln Gly Phe Lys Gly Leu Lys Ile Ser Arg Asp Leu Met Glu Val
355 360 365
Gly Gly Glu Ala Leu Lys Thr Asn Ile Thr Thr Leu Gly Pro Leu Val
370 375 380
Leu Pro Phe Ser Glu Gln Leu Leu Phe Phe Ala Ala Leu Val Arg Arg
385 390 395 400
Thr Phe Ser Pro Ala Ala Lys Thr Ser Thr Thr Ser Phe Ser Thr

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Ser Ala Thr Ala Lys Thr Asn Gly Ile Lys Ser Ser Ser Ser Asp Leu		
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465	470	475
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485	490	495
Glu Ala Lys Glu Ser Val Arg Arg Gly Asp Arg Val Trp Gln Ile Ala		
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Phe Gly Ser Gly Phe Lys Cys Asn Ser Val Val Trp Lys Ala Met Arg		
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Glu Ser Leu Gln Val Lys Tyr Gln Lys Phe Met Asp His Ser Lys Leu
145 150 155 160
Ile Glu Asp Phe Asn Glu Ser Ser Leu Glu Phe Gln Arg Lys Ile Leu
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Glu Arg Ser Gly Leu Gly Glu Thr Tyr Leu Pro Glu Ala Leu His
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Cys Ile Pro Pro Arg Pro Thr Met Met Ala Ala Arg Glu Glu Ser Glu
195 200 205
Gln Val Met Phe Gly Ala Leu Asp Lys Leu Phe Glu Asn Thr Lys Ile
210 215 220
Asn Pro Arg Asp Ile Gly Val Leu Val Val Asn Cys Ser Leu Phe Asn
225 230 235 240
Pro Thr Pro Ser Leu Ser Ala Met Ile Val Asn Lys Tyr Lys Leu Arg
245 250 255
Gly Asn Val Lys Ser Phe Asn Leu Gly Gly Met Gly Cys Ser Ala Gly
260 265 270
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275 280 285
Thr Tyr Ala Val Val Val Ser Thr Glu Asn Ile Thr Gln Asn Trp Tyr
290 295 300
Phe Gly Asn Lys Lys Ala Met Leu Ile Pro Asn Cys Leu Phe Arg Val
305 310 315 320
Gly Gly Ser Ala Ile Leu Leu Ser Asn Lys Gly Lys Asp Arg Arg Arg
325 330 335
Ser Lys Tyr Lys Leu Val His Thr Val Arg Thr His Lys Gly Ala Val
340 345 350
Glu Lys Ala Phe Asn Cys Val Tyr Gln Glu Gln Asp Asp Asn Gly Lys
355 360 365

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 485 490 495
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Gln	Glu	Asp	Lys	Glu	Gly	His	Val	Gly	Ile	Asn	Leu	Ser	Lys	Asp	Leu
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 Arg Gly Asp Arg Val Trp Gln Ile Ala Phe Gly Ser Gly Phe Lys Cys
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Ser Val Glu Ala Ser Gln Met Asn Pro Asp Asp Leu Lys Gln Leu Trp
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Ile His Leu Gln Tyr Asn Leu Val Ser Ile Ile Ile Cys Ser Ala Ile
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Tyr Leu Val Asp Phe Ser Cys Tyr Leu Pro Pro Asp His Leu Lys Ala
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Gly Glu Asp Thr Tyr Val Pro Glu Ala Met His Tyr Val Pro Pro Arg
165 170 175
Ile Ser Met Ala Ala Ala Arg Glu Glu Ala Glu Gln Val Met Phe Gly
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Ala Leu Asp Asn Leu Phe Ala Asn Thr Asn Val Lys Pro Lys Asp Ile
195 200 205
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225 230 235 240
Tyr Asn Leu Gly Gly Met Gly Cys Ser Ala Gly Val Ile Ala Val Asp
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260 265 270
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Cys Val Tyr Gln Glu Gln Asp Asp Thr Gly Arg Thr Gly Val Ser Leu
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355 360 365

Thr Thr Leu Gly Pro Leu Val Leu Pro Ile Ser Glu Gln Ile Leu Phe
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385 390 395 400
Tyr Ile Pro Asp Phe Lys Leu Ala Phe Glu His Phe Cys Ile His Ala
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Pro Val His Val Glu Ala Ser Arg Met Thr Leu His Arg Phe Gly Asn
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Thr Ser Ser Ser Ile Trp Tyr Glu Leu Ala Tyr Ile Glu Ala Lys
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